

BOTANICAL RESULTS FROM THE 1995 BISMARCK-RAMU EXPEDITION IN PAPUA NEW GUINEA

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ABSTRACT

Botanical results are presented from the 1995 biological survey of the Bismarck-Ramu tract, an area identified by multiagency assessment as a prime site for possible conservation action. The findings provide confirmation of the area's presumed biodiversity value. Over 610 distinct morphospecies and up to 15 confirmed or suspected plant novelties were documented by an intensive 24-day expedition. Three of the new species are formally described. General descriptions of the vegetation are also provided for the major floristic environments explored by the survey team. Adoption of special management and conservation measures is recommended for the subject territory.

ABSTRACT (MELANESIAN TOK PISIN)

Wanpela wok bus painimaut bilong ol saveman bilong ol bus diwai, rop, na gras, ibin kamap long Bismak - Ramu territori long Oktoba 2 igo 24, 1995. Ol saveman bilong bus ol i kaunim olsem moa long 610 ol kain kain diwai, rop, na gras i kamap long dispela hap. Na wok painimaut i kamapim olsem fiftinpela long ol diwai na gras i nupela kain olgeta. Dispela tupela ten na foa de wok i soim dispela ples Bismak - Ramu em i holim wanpela long ol kain ples bus we Papua New Guinea mas lukautim gut. Stori long dispela pepa i tok klia long olgera samting mipela lukim long Bismak-Ramu bus.

INTRODUCTION

Papua New Guinea (PNG) is a well known center for biological endemism and diversification. It ranks among the world's most botanically diverse countries, with a species-level floristic content variously estimated as high as 15,000–20,000 (Johns 1993), 20,000+ (Womersley 1978), and to ca. 25,000 (Mathew 1995). As one of its principal missions, the Department of Environment and Conservation (DEC) is responsible for identifying specific areas of conservation value within PNG. Based on several DEC internal evaluations and the Conservation Needs Assessment Report (Beehler 1993), a 168,000 hectare tract between Mt. Wilhelm and the Ramu River was recently selected for potential designation as a conservation unit (Figs. 1–2). This poorly-known area of interest (AOI) was suspected of sequester-

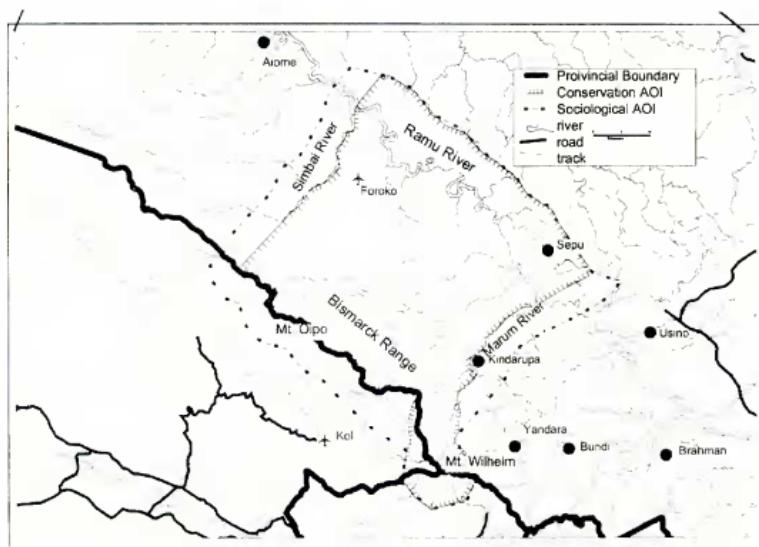
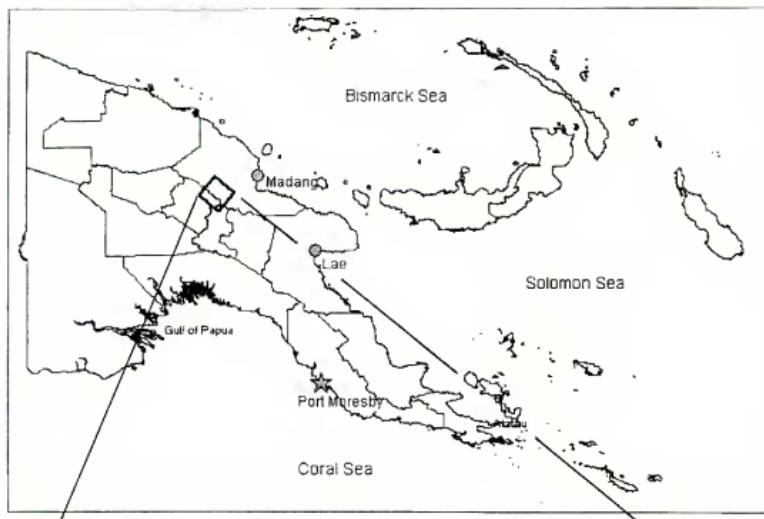


FIG. 1. Top. Papua New Guinea in aspect, showing the general location of the survey tract. FIG. 2. Bottom. Exploded view of the area of interest (AOI). Figures from Hedemark et al. (1997).

ing high biodiversity, and a survey was deemed necessary to secure more information on its suitability for further development as a protected zone.

During October 2–26, 1995, a biological survey was thus conducted from 4 base camps established between 600–2400 meters elevation inside the AOI (Fig. 3). Ten scientific participants from Papua New Guinea evaluated the botany, entomology, and vertebrate zoology of the area. Survey protocols were consistent with the ICAD (Integrated Conservation and Development) model. Although a comprehensive account of the expedition was published by Hedemark et al. (1997), only a cursory description of the vegetation was included since the botanical specimens had not been examined. Recently completed determinations, an amended site by site overview of the vegetation, synopsis of notable collections, and an improved species list (Appendix 1) can now be provided. A wide range of organizational, socio-cultural, and physical site information is presented in Hedemark et al. (*ibid*, to which the reader is referred), and will not be repeated here.

METHODS

The botanical component of the survey consisted entirely of opportunistic general collecting, employing the 'Kostermans method' of field-packing duplicates in 70% surgical spirit for deferred processing. A complete set of the Bismarck-Ramu plant collections has been deposited at Lae National Herbarium (LAE). Principal recipients of duplicate sets are A, BRIT, K, and L; residual sheets are dispersed in no particular sequence and are likely to be at the institutions of family specialists.

In genera for which revisions are available, vouchers were keyed to species and the result confirmed against annotated sheets at LAE. For unrevised groups, exsiccatae were matched against authentically identified material and/or original descriptions. A number of specialists were also consulted; their identifications are provided with attribution on the attached species list (Appendix 1).

In the following account, taxa are referenced by the collection number on which the claim is based. The text has been expanded from Hedemark et al. (1997: 41–44) by addition of taxonomic detail resulting from the new determinations.

VEGETATION SUMMARIES

Camp 1

Location: Mt. Oipu, GPS 05° 35.5' × 144° 47.3', elevation 2360 m

Life zone: montane

Forest type: elfin or low stature mossy cloud forest

Collections sequence: 10381–10625

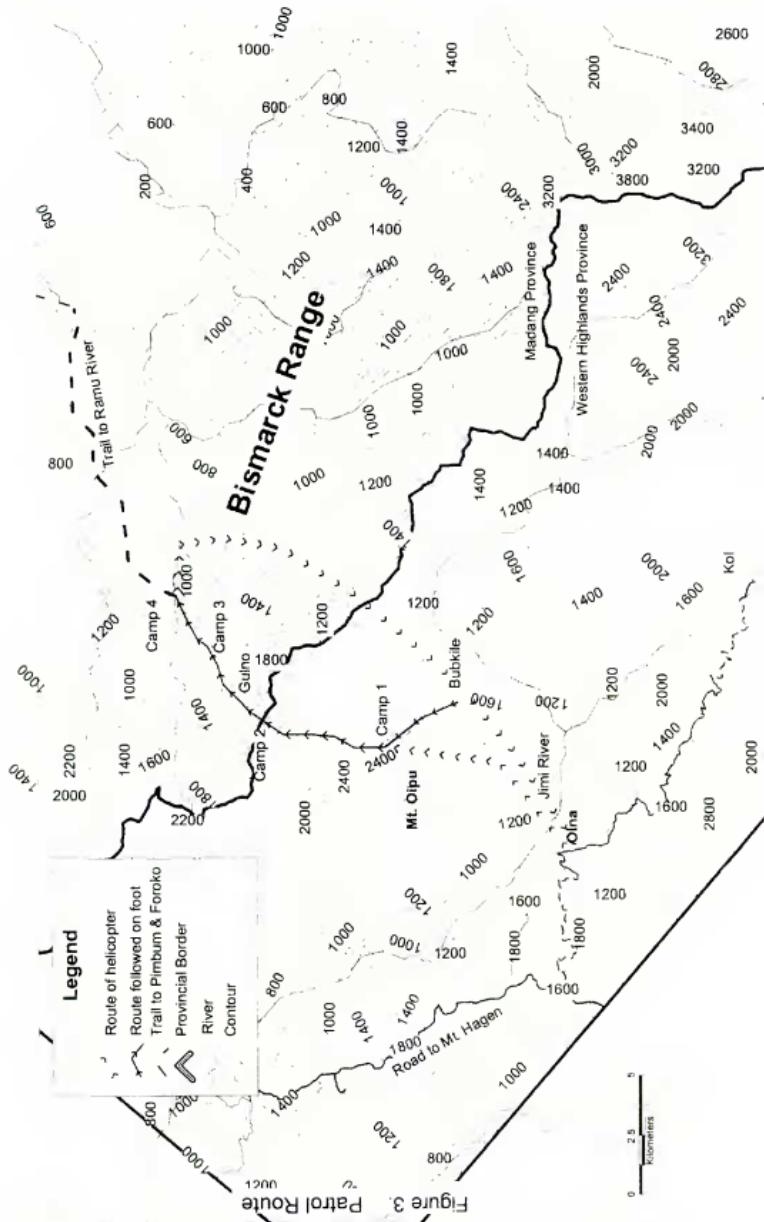


FIG 3. Trip route of the expedition. Reproduced from Hedemark et al. (1997).

At 2360 m, the expedition's highest camp was established in mossy ridgeline forest exposed to severe wind shear and constant misting. The vegetation at this site was generally stunted, taxonomically depauperate, and structurally unstratified. Stocking densities tended to be comparatively high due to the small size of most trees, with boles and crowns exhibiting the scraggly form and poor development typical of cloud stands. Due to steep slopes and everwet conditions, plant communities reflected the influence of frequent landslips and exposure of new earth. Successional montane taxa were prominent components of the vegetation on unstable terrain. A *Saurauia* complex with *S. cf. capitulata* (10596), *S. ilicifolia* (10424), *S. cf. naumannii* (10539), and a possible *Saurauia* sp. nov. (10447, 10570), was characteristic of colonizing communities. *Trimenia papuana* (10393, 10402) and the family Theaceae; including *Eurya* cf. *leptantha* (10394), *E. tigang* (10421, 10571), and *Ternstroemia britteniana* (10532, 10624), were also common in secondary growth. The regenerating facies was particularly striking and distinctive due to the towering inflorescences of *Harmsiopanax ingens* ssp. *ingens* (10514).

On the summit ridge beginning at ca. 2400 m, arborescent growth consisted of a stunted monolayer less than 4 m in height. The principal woody taxa were *Olearia rufa* (10598), *Prunus pullei* (10608), *Helicia microphylla* (10609), and *Ascarina philippinensis* (10613). *Acsmithia reticulata* (10603) was common in sheltered ravines off the crest.

On buttress ridges below the summit, the canopy layer was similarly reduced to dwarfed scrub. Phanerophytes typically included *Dillenia* cf. *schlechteri*/*quercifolia* (10495), *Elaeocarpus tariensis* (10422, 10591), *Garcinia archboldiana* (10494), *Planchonella monticola* (10589), *Podocarpus* sp. (10585, sterile), *Schuurmansia benningsii* (represented by two distinct architectural morphs: 10515 robust arborescent, and 10409 dwarfed form), *Weinmannia* sp. (all sightings sterile), and *Xanthomyrtus montivaga* (10602). Two *Pandanus* species; one monocaulous and planted, the other branched and naturally regenerating (§ *Intraobtutus*, 10623), were conspicuous emergents on summits and steep slopes, the latter species being otherwise scarce on level ground. The understory was occupied by various infraspecific forms of the highly variable *Symplocos cochinchinensis* (e.g., 10415, 10566, 10614). *Schefflera* shrubs from the 'S. schumanniana group' were also common, with representatives including *S. schumanniana* s. str. (10643, 10744), and allied forms such as *S. aff. sparsidentata* (10427, 10471). Lianes were relatively rare and inconspicuous.

Canopy statures increased progressively on the path descending towards Bubkile and lower slopes. However by elevation 2075 m, forest was replaced by grassland composed of weed and waif species characteristic of anthropogenic disturbance. *Eurya tigang* (10571), *Parasponia rigida* (10567), *Polyscias*

belensis (10580), and *Rhodomyrtus novoguineensis* (10568), formed a seral border between forest and grassland.

From the standpoint of floristic richness, herbaceous plants collectively represented the most important elements in the summit forest. Orchids and ferns were undoubtedly the most speciose groups. The genus *Cyrtandra* had more morphospecies than any other dicot understory constituent. Urticaceae was especially varied; *Elatostema blechnoides* (10450, 10478), *E. mongiense* (10535), *E. morobense* (10433), and *E. tridens* (10475) being particularly common. *Debregeasia* was also frequent, but the genus is unrevised and there are no available binomials for the Papuasian species.

Two new taxa were discovered on Mt. Oipu, including a *Pilea* sp. nov. (10481; also 10559, 10740 from Camp 2), and *Prunus* sp. nov. (10588).

While the community composition was unarguably that of a well-preserved native forest, several cosmopolitan weeds have encroached along established trails on ridgelines and buttress crests. Although adventive species are often ignored in biological estimates of site value, such plants are convenient indicators of the proximity and intensity of human activity. At elevations above 2200 m, alien species were limited to *Bidens pilosa* var. *minor* (10458), *Ageratum conyzoides* (10429), and an unidentified subshrub (10425, 10431) cultivated as a village ornamental. The introduced elements are benign herbs and not community-invasive taxa like *Piper aduncum* of disturbed lowland environments. A planted *Pandanus* (aff. *?julianettii*) was seen only as scattered individuals along footpaths, but is otherwise naturally-occurring in the Highlands region.

On Hammermaster and Saundar's (1995) system of vegetation classification, the Mt. Oipu communities are assigned to structural code 'L,' applied to lower montane forests (above 1000 m) having dense, small-crowned canopies. Such forests change progressively in composition and stature according to elevation, eventually grading into the high montane formations (loc. cit.: 14). The expedition's ground survey indicates that the Mt. Oipu summit is structurally and taxonomically very close to subtype code 'Ls,' referring to very small-crowned forest where emergents (except *Pandanus*) are generally absent.

The Mt. Oipu vegetation would also be regarded as a 'lower montane rain forest' on the system of Grubb and Stevens (1985). However the apparent equivalence hides significant distinctions in the way the term is applied by the different authors. The Hammermaster and Saunders classification is derived primarily from stand-level characters determined from aerial survey, with the objective of identifying merchantable forest. Grubb and Stevens employ higher-resolution criteria applicable only by ground inspection (e.g., incidence of buttresses, woody climbers, cauliflory, drip tips, etc.) and is purely phytoecological in orientation. Irrespective of the distinctions, Mt.

Oipu is clearly a lower montane rain forest sensu Grubb and Stevens, and of the 'mixed forest' type with no single dominant component.

Camp 2

Location: Mt. Gulno, GPS 05° 32.7' × 144° 47.8', elevation 2045 m

Life zone: montane

Forest type: medium stature mossy cloud forest

Collections sequence: 10647–10768; 10626–10646 from transit between camps 1 to 2

On Mt. Gulno, the canopy was similar to that from the first site. Many taxa were present at both camps, though apparently differing in their frequencies. Because of logistical concerns, collections were generally not repeated between camps for plants thought to be conspecific.

Kania engenoides (10648) was a dominant tree species around Camp 2. Other common trees included *Actinodaphne tomentosa* (10752), *Ascarina subsessilis* (10760), *Calodendrum rufa* (10673), *Cryptocarya nothofagetorum* (10652, 10680, 10728), and *Sloanea brachystyla* (10747). The most frequent shrubs were *Acronychia ledermannii* (10717, 10750), *Dysoxylum enantiophyllum* (10751), *Fittingia* sp. (10661, 10745), *Myrsine lencantha* (10573, 10671), *Pittosporum sinuata* var. *teniavilae* (10655, 10689), *Steganthera* cf. *insculpta* (10672), and *S. ilicifolia* (10749). Woody genera previously dominant on Mt. Oipu (*Weinmannia*, *Dillenia*, *Garcinia*, etc.), became less common at the second site. In general, phanerophyte taxa seemed more similarly abundant, though this was difficult to assess properly due to difficulties in making collections. Expedition climbers were rendered ineffective by rain, heavy misting, and thick bryophyte growth on tree trunks. Since the camp site was less exposed to wind, canopies generally exceeded 10 m, also making vouchers comparatively more difficult to secure.

As for camp 1, understory and epiphytic plants were very diverse, with ferns and herbs accounting for the majority of collections. Ericaceae was well-represented by *Diphyllospadix moroheensis* (10658), *Rhododendron anagalliflorum* s. str. (10686), *R. beyerinckianum* (10685), and *R. wrightianum* var. *insulare* (10656). The most notable find was a new species of *Bulbophyllum* (10724; det. N.H.S. Howcroft).

During the hike between camps 1 and 2, tall stature forest was encountered along the descent to the Kanel River and on the corresponding climb up opposing slopes to Mt. Gulno. A sharp structural break was evident at elevation 5700 feet aneroid (1740 m), with marked changes in epiphyte abundance, forest stature, and tree architectural form. This elevational level probably marks the lower limit of the cloud zone. The abruptness of physiognomic transition suggests that the cloud line is spatially fixed, at least locally.

The Mt. Gulno vegetation is assignable to the same forest classification units as discussed for Mt. Oipu.

Camp 3

Location: Wara Kanel (Kanel River), GPS 05° 31.8' × 144° 49.1', elevation 1545 m

Life zone: premontane

Forest type: tall stature ecotone forest with intermixed lowland and montane taxa

Collections sequence: 10769–10964

Camp 3 was sited in secondary vegetation extending along the Kanel riverbed and over adjacent slopes. *Saurania* and *Cyathea* were the most conspicuous members of this riverine formation. In the former genus, the major species included *Saurania* aff. *conferta* (10815), *S. congestiflora* (10826), *S. cf. naumannii* (10904), *S. schumanniana* (10940), and an unusual subglabrous species (10829, not *S. plurilocularis*). *Cyathea angiensis* (10848) and *C. wernerii* (10794) were common tree ferns in heliophytic situations, while *C. bornei* (10846) was frequent in advanced regrowth. *Gastonia spectabilis* (10956) was a massive emergent. Other plants indicative of disturbance were repeatedly encountered throughout the area, their dominance the result of subsistence agriculture by Gulno villagers. Euphorbiaceae and Piperaceae were prominent in the successional vegetation, being represented by *Euphorbia plumerioides* var. *acuminata* (10792), *Homalanthus noto-guineensis* (10957), *Mallotus papuanus* (10947), *Piper lessertianum* (10874B, 10927), *P. raditzii* (10773), and *P. subnullatum* (10822). In mid-seral phases, *Alpinia excelsa* sensu Schirarend (no coll.), *Melicope* spp. (10823, 10892), *Geunzia pentandra* (10821), and *Trema cannabina* (10918) became frequent, often forming dense stands. This regrowth association is found throughout northeastern PNG whenever human or natural agencies permit establishment of seral taxa. Phytogeographically, the weedy plants often range over the whole of Papuasia and also into the larger Malesian region. Several alien species were noted, mainly ephemerals such as *Crassocephalum crepidioides* (10799) and *Erechtites valerianifolia* (10797).

Away from the river, the primary forest canopy was diverse and more difficult to characterize. *Podocarpus* (10952, sterile) and *Calophyllum* (populations sterile) were common trees in a premontane assemblage also composed of Cunoniaceae, Elaeocarpaceae, Ericaceae, Lauraceae, Myrsinaceae, and Winteraceae. Intermixing with montane taxa were lowland representatives from Moraceae (principally *Ficus*) and Meliaceae (*Aglaiia*). Urticaceae, Zingiberaceae, and various small ferns dominated the understory layer. Among the more abundant gingers were *Alpinia wernerii* (10869), *Alpinia* sp. § *Dieramaalpinia* (10964), *Elingeria* sp. (10878), *Pleuranthodium* sp. § *Psychanthus*

(10849, 10959), and *Tapeinochilos* (populations sterile). Common urticates included *Elatostema beccarii* (10894), *E. aff. belense* (10891), *E. novo-guineense* (10885, 10896), *Poikilospermum inaequale* (10858), and *Procris frutescens* (10901). In general however, the forest floor community was sparse and taxonomically depauperate. The most notable collections were possible new species in *Dendrobium* § *Grastidium* (10856; det. N.H.S. Howcroft) and *Myrsine* aff. *acrostica* (10958; det. J. Pipoly).

Unlike the montane camps, epiphytic loads were minimal and tree boles typically lacked mossy growth. Canopy species tended to be represented by trees with massive stems branching high above the ground (>20 m). There appeared to be sizable populations of merchantable *Elaeocarpus* and *Syzygium*, but this could not be confirmed by fertile gatherings. In contrast to the situation at the montane sites, virtually all the arborescent taxa in the mature growth forest were seen only in sterile condition. The few fertile individuals were often too high in the overstory for collection, the only exceptions being *Ceratopetalum succirubrum* (10853), *Flindersia pimenteliana* (10944), and *Lithocarpus* cf. *celebicus* (10785). According to local respondents, the forest trees begin flowering in November or December after the start of the rainy season, a claim consistent with climatic data reviewed in Hedemark et al. (1997).

The Kanal River forest is regarded as lower montane by Hammermaster and Saunders (1995), but differs from the previous sites in the appearance of lowland elements. Genera recorded from camp 3 which are characteristic of the lowland zone include *Caryota* (sightings), *Aceratium* (10806), *Leea* (10825), *Pometia* (sightings), and *Poikilospermum* (10858). Lowland rain forest can ascend to 1500 m (van Royen 1964), and the floristic composition of the Kanal locality is transitional to such forests. Unlike high elevation formations, the lowland-montane ecotone exemplified by the Kanal site has not received critical attention in Papuasia (Grubb & Stevens 1985). Future surveys in the Bismarck-Ramu tract could profitably focus on the transition, especially as unpublished findings from recent RAP (Rapid Assessment Protocol) surveys suggest that floristic richness in Papuasia peaks at or near this elevational level (e.g., Beehler 1997; Kulang et al. 1997).

Camp 4

Location: Wara Ikil (Ikil River), GPS 05° 30.8' × 144° 50.6', elevation 600 m

Life zone: lowland

Forest type: tall stature alluvial and foothill forest

Collections sequence: 10969–11110; 10965–10968 from transit between camps 3 to 4

Flanked by steeply ascending ridges, camp 4 was the most isolated expedition site and the least affected by disturbance. However on riverine flats, the vegetation was still subject to natural upsets and marked by the development of *Pometia* dominant canopy. Such communities are very typical of lowland environments throughout northern PNG. In addition to *Pometia pinnata*, the woody taxa on alluvial ground usually included *Bridelia penangiana* var. *penangiana* (11020), *Callicarpa longifolia* (10973), *Chisocheton laesiocarpus* (11000), *Dolicobolium oxylobum* (11042), *Endospermum labios* (11048), *Leucosyke capitellata* (11044), *Mussaenda scratchleyi* (11097), *Pipturus argenteus* (10990), *Prunus dolichobotrys* (11037), *Saurauia* aff. *conferta* (11036), and *Anacardiaceae*. The latter was represented primarily by sterile *Buchanania*, *Campnosperma brevipetiolata*, and *Semecarpus*. Subarborescent *Ficus* was represented by large populations of *F. arbuscula* (11038) and *F. comitis* (11100). The most common herbaceous plants were *Derris cuneifolia* (11031), *Desmodium sequax* (11023), *Pueraria pulcherrima* (11029), and *Stachytarpheta cayennensis* (11028). *Urticaceae* was also common, with many sightings of *Boehmeria platyphylla* (11016), *Cypholophus nummularis* (11018), *Elatostema novo-guineense* (11022), *E. weinlandii* (11096), *Laportea decumana* (10974), and *Poikilogyne macrophylla* (11095).

The slopes and ridges above Wara Ikil have taxa less common than those along the river and represent a more diverse forest. Proper botanical assessment of such communities requires considerably more time and effort than is possible with brief surveys such as ours. From general impression, the stands near Camp 4 could be the richest plant community encountered by the expedition. Both the Kanal and Ikil foothills would no doubt repay further efforts at exploration.

Notable collections were *Antidesma katikii* (11054, 11079), formerly known only from a type collected in the Ramu area, *Garcinia* sp. nov. (11098, det. P.F. Stevens), *Psychotria* sp. nov. (11090), and *Syzygium* sp. nov. (11068).

The Kanal River vegetation is assigned to type code 'Hm' on Hammermaster and Saunders (1995), a category consisting of medium crowned forests on uplands below 1000 m. The camp 4 area has the most merchantable timber seen during the survey and represents the forest type of greatest interest to commercial operators.

NEW SPECIES, DISTRIBUTIONAL RECORDS, OR OTHER NOTEWORTHY COLLECTIONS

PTERIDOPHYTES

DENNSTAEDTIACEAE

Hypolepis scabristipes Brownsey; coll. 10778. Apparently a rare fern, represented by few collections in the Malesian region (Brownsey 1987). **Hypolepis scabristipes** is a distinctive species, with yellowish-brown stipes marked by darker excrescences from the dilated hair bases (loc. cit.).

THELYPTERIDACEAE

Sphaerostephanos sp. ?nov.; colls. 10707 and 10733. The genus is one of the most speciose in Malesia (Holttum 1981) and includes numerous localized endemics. Our expedition numbers are sessile-glandular on both lamina surfaces, lack indusia, and have laxly setose sporangia. Sori are multiserial and sometimes confluent. The collections are closest to *S. adenostegius* and *S. warburgii*.

MONOCOTS

ORCHIDACEAE

Bulbophyllum sp. nov.; coll. 10724

Dendrobium sp., § *Grastidium*; possible sp. nov.; coll. 10856. About 45 orchid species were collected during the survey, from which orchidologist N.H.S. Howcroft has determined two numbers as representing new species.

ZINGIBERACEAE

Alpinia sp. aff. *odontonema*, § *Pycnanthus*; coll. 10595. This differs from *A. odontonema* s. str. in its sessile leaves with raised nervation on upper surfaces. The expedition's collection conforms to material cited by R.M. Smith (1978) as an undescribed species.

DICOTS

ARALIACEAE

Polyscias belensis Philipson; coll. 10580. An uncommon montane tree, previously known from Bele River in West Iryan and from Morobe Province (Philipson 1979). Lae Herbarium has only one sheet of this taxon. Apparently a first record for the Highlands Provinces.

Resembles a *Gastonia* but the pedicels are distally articulated. The voucher agrees in detail with the single sheet annotated by Philipson at LAE.

Schefflera aff. *sparsidentata* Frodin; colls. 10427, 10471. A possible novelty in the *S. 'schumanniana-schraderiana* complex' from which a number of new species have been described by Frodin (1982).

Closest to *Schefflera sparsidentata* but differing in the more robust inflorescence with extended rachis, glabrescent axes, and much longer pedunculate umbellules. The flowers are distinctly pedicellate rather than sessile. The conspicuous peduncular and floral bracts are densely clothed with setiform innovations on margins and/or surfaces.

CLUSIACEAE/GUTTIFERAE

Garcinia sp. nov.; coll. 11098. A *Garcinia* with cordate-based leaves has been preliminarily determined by P.F. Stevens as a novelty (pers. comm.).

The new species was seen as a single 10 m tree growing on the ridgeline above camp 4. Its leaves are sessile, decussate, firm-coriaceous, and abaxially

glandular-lineate. It is vegetatively distinguishable from other species by the subovate blade, typically 11.5×7 cm, with reflexed margins and amplexicaulous cordate base. The flowers are deployed in numerous axillary or infrrafoliar fascicles, seemingly bisexual but probably functionally unisexual and with the plants dioecious.

ERICACEAE

Rhododendron anagalliflorum Sleumer; colls. 10389, 10686. As delimited by Craven (1980), *R. anagalliflorum* is an uncommon species confined to the Carstenz Mts. and the Bismarck-Wahgi-Jimi Divide. It has the reduced leaves characteristic of Series Linnaeoidea.

The expedition vouchers were procumbent or decumbent epiphytes. Corollas were campanulate, chartaceous, white or pink, with erect lobes and outer surfaces exclusively lepidote. The ovary is densely clothed with patent hairs but also provided with a lesser indumentum of coarsely tuberculate scales. Styles did not exceed the ovary and were mostly glabrous.

EUPHORBIACEAE

Glochidion sp. nov.; coll. 11543. The collection was from a subarborescent species seen in cloudy montane forest. It does not key out on Airy Shaw (1980). In appearance most like *Glochidion frondinii* and *G. urceolare*, but separable on the following combination of characters:

Vegetative parts hispidulous. Inflorescence axillary or internodal; pistillate flowers often solitary. Capsules globose, 1.5 cm diameter, subsessile, glabrous, exocarp somewhat verrucose.

The capsules are eaten raw by Bubkile villagers, a practice not usually encountered for Papuasian *Glochidion*. The fruit is crunchy in consistency and has a rather pleasant aftertaste. Unfortunately, this resulted in the village laborers consuming all the gatherings as they were made, leaving only a unicate for the press.

Macaranga reiteriana Pax & Hoffman; colls. 10496, 10508. *Macaranga reiteriana* was formerly known only from Morobe Province, Gulf Province, and the Idenburg River (Whitmore 1980). Lae Herbarium has material from each of the areas cited in Whitmore (ibid) but no new occurrences have been added to the national collection since then.

The species is distinguished by the single elongate stipule, narrow leaves, and solitary fruits on bare peduncles. It is frequent in regrowth communities on Mt. Oipu. Recent work at Crater Mt. in Simbu (Chimbu) Province has also documented the presence of the species from that area (e.g., *Takeuchi* 12262, 12274). Although the expedition vouchers represent a distributional record for the Highlands region, the plant is almost certainly more common and widespread than herbarium specimens would indicate.

Mallotus papuanus (J.J. Sm.) Pax & Hoffman, or aff.; coll. 10947. The

species has paired leaves; each leaf pair consisting of a highly reduced, stipuliform lamina opposed to an unreduced caudate blade. An indumentum of fulvous hairs covers the apical parts and underleaves.

Mallotus papuanus was previously regarded as endemic to West Iryan (Airy Shaw 1980). The expedition collection is apparently a first record for Papua New Guinea. Although annotated specimens of *M. papuanus* have not been seen, the species' characteristics are sufficiently distinctive for a description-based identification.

EUPHORBIACEAE/STILAGINACEAE

Antidesma aff. chalaranthum Airy Shaw; coll. 10716 (fr). *Antidesma chalaranthum* is known with certainty only from the staminate type collection, obtained from Goroka subdistrict in the Eastern Highlands (Airy Shaw 1979). A second specimen (Streimann & Kairo NGF 27636), was referred to this species as an example of the female plant, though the assignment was explicitly provisional (loc. cit.). The expedition voucher is similar to NGF 27636; both numbers being subappressedly puberulent on twigs, inflorescence axes, and abaxial midveins. Fruits are also identically glabrous, 5 mm in diameter, and with lateral styles. However our Bismarck collection has drupes distinctly oblique, compressed, and lacking a thin-crustaceous pericarp; characters unlike the number cited by Airy Shaw. There are possibly two taxa hidden in the *chalaranthum* facies.

Antidesma katikii Airy Shaw; colls. 11054, 11079. Supposedly a rare endemic, previously known only from the type specimen (Coode & Katik NGF 32762) originating near the Ramu River at 90 m elevation. The large linear-lanceolate leaves with pubescent midrib readily identify the species (Airy Shaw 1973, 1980). Unlike the type, the expedition collections include flowering material, from which the following accessory description is provided:

Inflorescence from leaf-bearing or defoliate nodes, axillary, racemose, 2–6 cm long, rachis patently pubescent; bracts ovate, 0.5 mm long; pedicels to 1 mm, provided with indumentum like the rachis; perigone cotyliform, typically 1 mm × 0.5 mm, glabrescent or puberulous, margins minutely toothed, otherwise truncate; disc tomentulose; ovary asymmetric, 0.8 mm × 0.6 mm, pilosulous; styles excentric, 2–4, divergent or reflexed, 2-fid.

Antidesma katikii is locally common and a characteristic taxon in the Kanal drainage. The label on the type indicates that the species was very abundant in disturbed forest at the original collection site. It is likely that the plant is not as rare as the scarcity of specimens would suggest, but is simply undercollected and of limited range.

LAMIACEAE/LABIATAE

Basilicum sp.; coll. 10626. The collection is not *B. polystachyon*, the only *Basilicum* species recorded for Papua (cf. Keng, 1978). It may represent a

new species or a distributional record. The plant's major characteristics are:

Suffrutescent and terrestrial. Leaves opposite, herbaceous, sub-bullate, adaxial surface dark green, abaxially purple. Inflorescence terminal only, racemiform, axes puberulent; verticillasters about 1.5 cm apart, short and sparingly branched; pedicels long. Calyx bilabiate, manifestly venose (also with intercostals), hairs subulate and septate; lower lip with 3 segments, midlobe furcate and biapiculate, lateral lobes much reduced, rounded or obtuse; upper lip wider, entire, shorter than the lower labium. Corolla blue to violet, bilabiate, tube contorted, shorter than the calyx; upper lip shallowly 4-fid; lower lip induplicate, entire, enlarged, enfolding the stamens; stamens didynamous, scarcely exserted, connate at the base, filaments glabrous but with some sort of median callosity, anthers discoid and centrifixed; stigma 2-fid.

MELASTOMATACEAE

Astronium novoguineense Merrill & Perry; coll. 10762. The species was formerly reported only from West Iryan and is now newly recorded for Papua New Guinea.

Collection 10762 keys out to couplets 71–72 in Maxwell & Veldkamp (1990) and best matches *A. novoguineense*. However the shape of the calyx tube also suggests *A. fragilissimum*. If the specimen is actually the latter species, it would represent a first record for Mamose (i.e., northern PNG) region, since *A. fragilissimum* is currently known only from Central Province (loc. cit.).

Medinilla sp. nov.; coll. 10408. Keys to species 49–52 in Mansfeld (1925) but does not match the binomials there. The collection is somewhat like Merrill and Perry's '*mansfeldiana-markgraffii*' group except for the cernuous cauline inflorescence. Other salient characteristics are the following:

Epiphytic, erect, monocaulous or not. Stems and innovations setose. Leaves opposite, acroskopically directed, elliptic, to ca. 20 cm × 7.5 cm, glabrous except near the base of abaxial costae, 5–7 plinerved. Petioles proximally provided with large auriculiform alae, the auricles foliaceous, paired, purple, rounded but with margins erose. Inflorescence racemiform or sparingly ramifying, conspicuously and persistently bracteate.

MONIMIACEAE

Steganthera insculpta Perkins; colls. 10513, 10672. *Steganthera insculpta* is the only species in Philipson's (1986) conspectus with subsessile female inflorescences. It was previously known from two collections in the Sepik region (ibid).

MYRSINACEAE

Myrsine aff. *acrostica* (Mez) Pipoly; coll. 10958. *Myrsine* is currently be-

ing reviewed by J. Pipoly, and Malesian taxa formerly included in *Rapanea* are being transferred to *Myrsine*.

Collection 10958 is either a new species or a very aberrant *Myrsine acrostica* (Pipoly, pers. comm.).

MYRTACEAE

Syzygium sp., aff. *megistophyllum* Merrill & Perry; coll. 11068. The collection keys out to *S. megistophyllum* in Hartley and Perry (1973). It differs from that species in the linear-elliptic leaves, to 36 cm × 8.5 cm in size, with base subsessile-emarginate but not deeply cordate. The lateral veins are in 25–30 pairs, generally straight, and obliquely diverging to a commissural nerve 2 mm from the leaf margin.

Syzygium megistophyllum is apparently known only from a fruiting specimen obtained in West Iryan (loc. cit.). The inflorescence on 11068 was caudate, developing as abbreviate cymes ≤ 4 cm length at the base of a short stem. This is not too different from the description for *S. megistophyllum*, though the foliar characters are otherwise distinct. The expedition voucher probably represents a new species.

PIPERACEAE

Piper lessertianum (Miq.) C. DC.; colls. 10874B and 10927. The species is a laxly pubescent climber with auriculate leaves. It is infrequently collected and apparently uncommon; Lae Herbarium has only two sheets of this taxon.

ROSACEAE

Prunus gideonii Takeuchi, sp. nov. (Fig. 4). TYPUS: PAPUA NEW GUINEA.

WESTERN HIGHLANDS PROVINCE: Bismarck Range, Mt. Oipu, ridge between 'Camp 1' and Bubkile, GPS lat. 05° 35.513' S, × long. 144° 47.252' E, elevation 2357 m, 07 Oct 1995 (fr), W. Takeuchi 10588 (HOLOTYPE: LAE; ISOTYPE: L).

A *P. pullo* laminis lanceolatis (non ellipticis vel oblongis) 15 cm longioribus (nec minoribus), atque glandularibus basalaribus obsoletis (non praeditis), denique habitu monoaxiali (non polyaxiali) facile dignoscenda.

Understory shrub, monocaulous or hardly branched at the top; provided with fulvous to orange-brown indumentum on all vegetative parts. *Stem* ascending, weak, virgate, 2–3 m long, woody throughout. *Branchlets* few or none, if present short and obliquely ascending, tomentose. *Stipules* conspicuous, paired at the petiole base, free, lanate, persisting, acuminate, 12–20 mm × 5–10 mm. *Leaves* spirally arranged, firm, manifestly bullate; mature blades lanceolate to oblong-lanceolate, 18–27 cm × 9–11 cm, apex acute, margin reflexed, base obtuse or subequally notched, often induplicate; adaxial surfaces dark green, initially pilose on veins, later glabrescent, abaxially orange-brown and lanate, opaquely punctulate; lateral veins 6–9 pairs, obliquely diverging, supramedially looping and usually closing at 2–4 mm from the

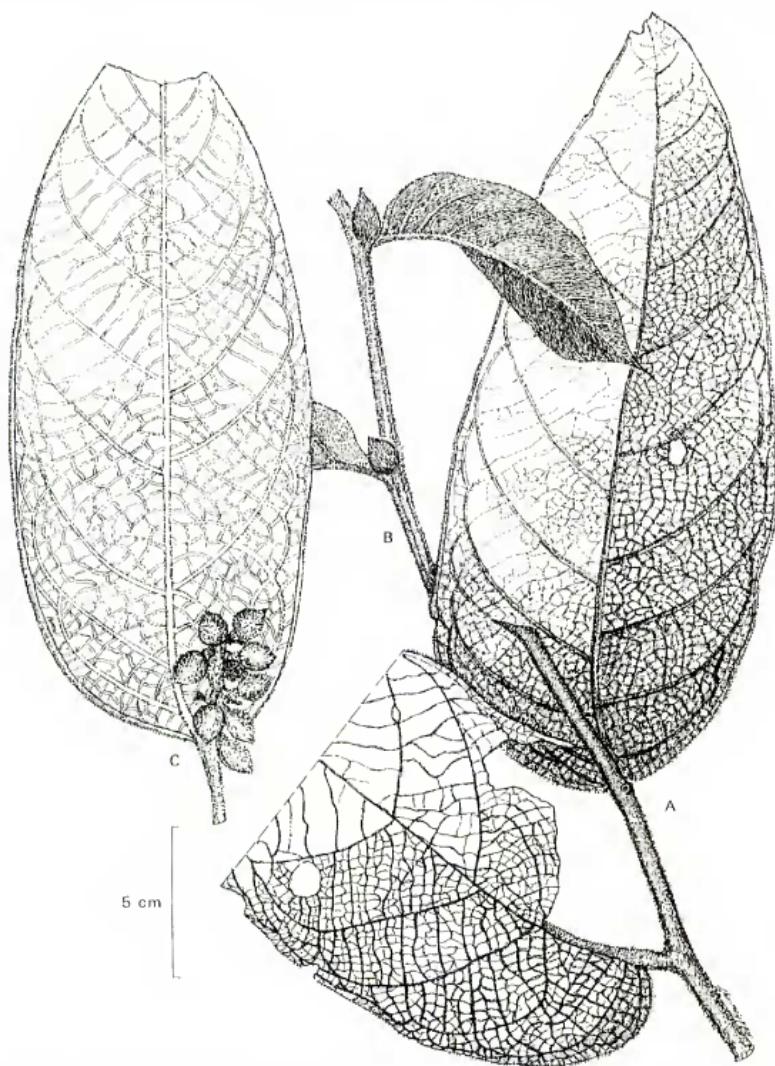


FIG. 4. *Prunus gideomii* Takeuchi, sp. nov. A: habit, mature leaves. B: shoot with stipules and immature leaves. C: inflorescence.

margin, nervation deeply impressed above, on undersides very elevate, areolate and with blackened nerves; basal glands absent; petioles 12–15 mm long, entirely pubescent. *Inflorescence* not seen. *Infructescence* racemose, solitary, axillary from attached leaves, 4–8.5 cm long, rachis 3–4 mm thick, lanate; pedicels 4–12 mm long, densely pubescent. *Drupe* ovoid to subglobose, 12–13 mm × 9–10.5 mm, hypanthium residue 3–5 mm diam.; epicarp pinkish-red, appressedly hairy; style persisting, stigma capitate or somewhat discoid; endocarp glabrous. *Seed* single, abortive or immature, crispate; testa glabrous.

Distribution and ecology.—*Prunus gideonii* is known only from the type locality, in stunted montane forest within the cloud zone.

Etymology.—The new species is named for Dr. Osia Gideon, a specialist in Papuanian Rubiaceae and Costaceae, and currently the deputy director of the PNG Forest Research Institute.

Prunus gideonii has a distinctive aspect, with fulvous-lanate hairs on nearly all parts and large bullate leaves to 25 cm × 11 cm. Other diagnostic features are the sub-monocaulous habit and the conspicuous, persisting stipules.

The plant's sectional affinity is unclear because the type is apparently aglandular and lacks flowers. On the basis of phytogeography, *P. gideonii* probably belongs to subgenus *Laurocerasus* section *Mesopygeum* (cf. Kalkman 1965). The type keys out to *Prunus pullei* in Kalkman (1993) but is obviously not that species.

On Kalkman's (ibid: 322–26) key to fruiting specimens, the simplest way of accommodating the new binomial is by deleting *P. pullei* from fork 46 but retaining line 46b as the lead to the following couplet:

Ramiform trees or shrubs; leaves elliptic to oblong, 2–12 cm length, basal glands present <i>Prunus pullei</i>
Monocaulous or sparingly branched shrubs; leaves lanceolate, >15 cm length, basal glands absent <i>Prunus gideonii</i>

RUBIACEAE

Psychotria howcroftii Takeuchi, sp. nov. (Fig. 5). TYPUS: PAPUA NEW GUINEA.

MADANG PROVINCE: Bismarck Range, ridge above 'Camp 4,' GPS lat. 05° 30.771' S, × long. 144° 50.646' E, elevation 900 m, 23 Oct 1995 (fl, fr), W. Takeuchi 11090 (HOLOTYPE: LAE; ISOTYPES: A, BISH, BRIT).

Propter inflorescentiam trichotomam, stipulas valvatas, tubum corollinum 2 mm longiorum, denique fructum magnum, *P. solomonensis* valde arcte affinis, sed ab ea laminis 22–30 (non 17–20) cm longis, nerviis secundariis 15 minoribus (nec majoribus), denique floribus pedicellatis (non sessilibus) statim distinguitur.

Fruticose or subarborecent to 4 m height, vegetative parts entirely glabrous. Stem erect and laxly branching, basal swell absent. Branchlets terete, 4–7 mm diam., pithy, fleshy, moderately robust, collapsing when dry, surfaces smooth and nitid. Stipules valvate, basally connate, ±fugacious, at first

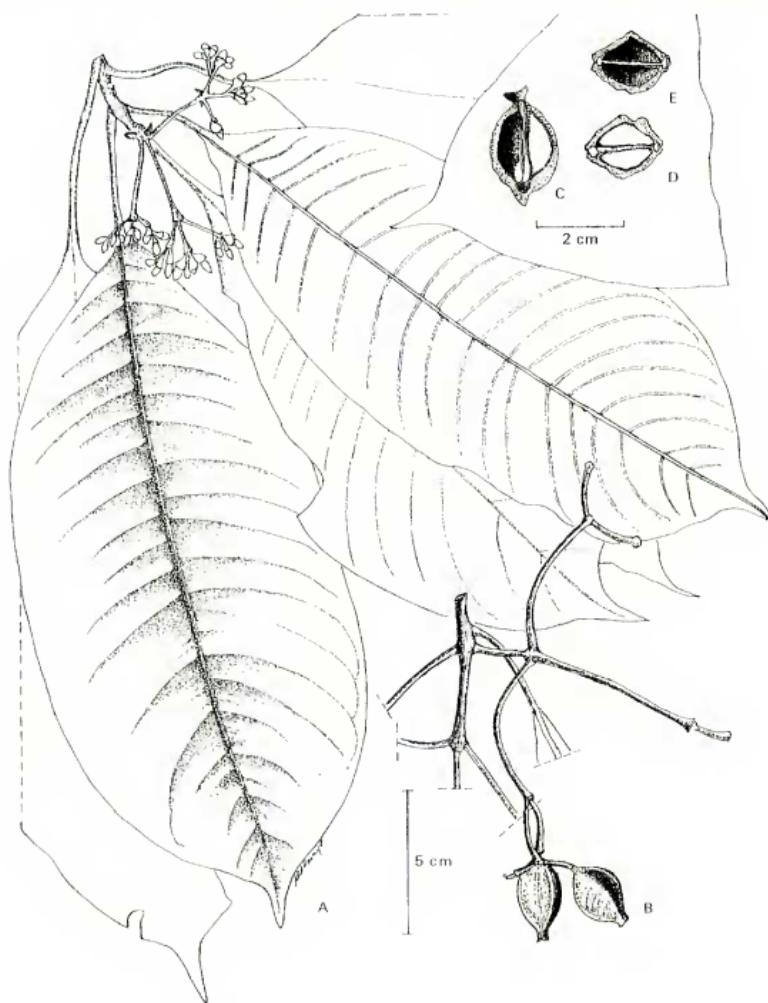


FIG. 5. *Psychotria boucraftii* Takeuchi, sp. nov. A: habit; mature leaves and young inflorescence. B: architectural form (ternate) of the infructescence. C: drupe in longisection. D and E: drupe in cross-section. Endosperm ruminations not shown.

acuminate and conduplicate, expanding and ovate when fully developed, 7–9 mm × 6 mm, undulate, margins entire. Leaves opposite, coriaceous, spreading, domatia lacking; mature lamina oblanceolate-oblong, 22–30 cm × 8–13 cm, apex abruptly acuminate, base cuneate; adaxial surfaces dark

green, abaxially very pale green, in siccō bifacially fuscous; lateral veins in 16–19 pairs, equispaced, evenly arcuate, closing only rarely by marginal loops, major veins embossed on upper side, prominulous beneath; reticulum feeble, the crossing nerves subscalariform, otherwise with plexus irregular; petioles 4–6 cm. *Inflorescence* terminal, to 5 cm length, umbelliform, 3 rachises connivent and approximately 'trichotomous', primary branches ternate-verticillate, ultimately cymose, all axial surfaces light green and glabrous; bracts caducous, deltoid, minute, reflexed, adaxially pilosulous. *Flowers* sessile and externally glabrous; calyx cupular-turbinate, 5–6 mm × 4–6 mm, margins strictly truncate; corolla 4-merous, valvate, white, the bud acute, 9 mm × 2.5 mm prior to anthesis, lobes oblong, divided to 3 mm from the base (rehydrated bud 12.5 mm × 4.5 mm with segments 7.5 mm × 3 mm and divided to 5 mm from the base); throat pilose, hairs septate-moniliform; stamens 4, alternipetalous, adnate near the sinuses; anthers dorsifixed, oblong; style exceeding the anthers, glabrous, ?heterostylous; stigma 2-fid and fimbriate; disc annulate, glabrous, marked by a central excavation after stylar abscission; open flowers not seen. *Infruktescence* diffusely paniculiform-umbelliform, flaccid, to 10 cm length, articulated at the ramifications; peduncle 2 cm. Drupes subglobose-ellipsoid, 19–22 mm (excluding calyx) × 15–17 mm, pericarp orange-red, convex, contracting and conspicuously angulate after drying; calyx tube persisting at the summit, vasiform to cylindric, 3–4 mm × 4–6 mm. *Pyrenes* 2, equal, plane on the commissural face, dorsally crested; endosperm ruminant.

Distribution and ecology.—Known only from the type locality, there occurring as scattered individuals in the understory of mature growth forest or in stands with advanced regrowth.

Etymology.—The new species is named for N.H.S. Howcroft; an orchidologist, silviculturist, and botanical illustrator, currently serving as the managing consultant of a balsa project in New Britain.

Psychotria howcroftii is immediately distinguished by the exceptionally large fruits borne on a diffuse, articulated infructescence. The oversized drupes are made even more conspicuous by persistence of the 4 mm long calycine tube. Among Papuan *Psychotria* only *P. monopedicellata* has fruits as large but that species has calyptrate stipules and monoaxial inflorescences (Sohmer 1988).

The immature inflorescence on *P. howcroftii* appears trichotomous (sensu Sohmer), but since the mature infructescence is pedunculate, the initial trichotomous structure is merely due to delayed prolongation of the peduncle. Another developmental peculiarity is that stipular form becomes manifest only at the subapical node, the stipules being otherwise severely enfolded at the apex.

The new species will key to fork 36 on Sohmer (1988: 15). It can then be assimilated to the existing decision train by deleting lead 36b for *P. solomonensis* and adding the following:

36b. Corolla tube at least 2 mm long

 Mature blades >20 cm long; lateral veins >15 pairs; fruits >15 mm long *P. howcroftii*
 Mature blades <20 cm long; lateral veins <15 pairs; fruits smaller *P. solomonensis*

URTICACEAE

***Pilea hedemarkii* Takeuchi, sp. nov.** TYPUS: PAPUA NEW GUINEA. BORDER OF WESTERN HIGHLANDS PROVINCE AND MADANG PROVINCE: Bismarck Range, near 'Camp 2' on Mt. Gulno, GPS lat. 05° 32.7' S, x long. 144° 47.8' E, elevation 2040 m, 12 Oct 1995 (fl, fr), W. Takeuchi 10740 (HOLOTYPE: LAE; ISOTYPES: K, L).

Species haec inter se allis species generibus, laminis linearibusque uninerviis atque squamibus aurantiaco-lepidotibus indutis praeclaræ distat.

Weakly ascending monocauls or ramiform chamaephytes, <0.5 m height, terrestrial, monococious. *Stems* slender, terete, glabrate, orange-brown, marked by parallel cystoliths or not. *Stipules* axillary, connate, caducous, obscure, 0.2–0.3 mm long, entire. *Leaves* paired, isomorphous but generally unequal, divergent, glabrous, chartaceous, bifacially squamulose; scales diffuse, peltately based, orange-hyaline with darkened centers; lamina linear, major blades usually 17–34 mm × 2–3 mm, apex acute, margins distally and distantly serrate, proximally entire, base obtuse; adaxial surfaces dark green, provided with linear cystoliths, these mostly transversal, less often randomly directed, on leaf margins abruptly longitudinal and congested; abaxial surfaces pale green to glaucous, collaterally glandular-lineate along the midrib; venation unicostate, other nervation invisible; petiole 1–3 mm long. *Inflorescence* axillary and solitary; cymes glomerulate, several together, occasionally simple; peduncle obsolete or to 9 mm long and filiform. *Male flowers* (rehydrated measurements) sessile or less commonly pedicellate, bracteolate, glabrous, entirely white; perigone 4-fid, typically 3 mm long, 1.5 mm wide at the base, ovoid in bud, segments lanceolate-ovate, each about 1.8 mm × 1.2 mm, costate, the rib excurrently corniculate or mucronulate; stamens 4, oppositi-tepalous, adnate to the tube, filaments inflexed; pistillode reduced to a minute flap. *Female flowers* glabrous, pedicelled or appearing sessile when immature; perigone 3-partite, fleshy, lateral segments vestigial, median segment enlarged and accrescent, acroscopic; staminodes 3, globular, oppositi-tepalous; ovary ellipsoid to cylindriform at first, later oblique and compressed; stigma penicillate, semi-persisting, directed at the major tepal. *Inflorescence* entirely light green. *Fruits* basiscopic on a retrorsely turned stalk, asymmetrically ovoid, 1.2–1.0 mm × 1.0 mm, compressed, marginate; pericarp thin and smooth. *Seed* flattened, rostrate.

Distribution and ecology.—*Pilea hedemarkii* is known from montane forest

in the Western Highlands, Madang, and West Sepik Provinces. During the expedition it was often seen along footpaths and forest margins. Another collection which is referable to this species (NGF 41691), has a label describing its habitat as 'broken forest,' further showing that the plant is found in successional situations.

Etymology.—The new species is named for Michael Hedemark, the expedition leader and a former conservation biologist with the United Nations Development Program. He is currently with the Wildlife Conservation Society in Laos.

Other Specimens Examined: PAPUA NEW GUINEA. West Sepik Province: Bli Mt. south of Oksapmin, broken forest on hillside, lat. $05^{\circ} 20' S$ \times $142^{\circ} 15' E$, elevation 7200' (2195 m), 22 Oct 1968 (fl), *E. Henty, R. Isgar, & M. Galore*, NGF 41691 (A, BRI, CANB, K, L, LAE). Western Highlands Province: Bismarck Range, Mt. Oipu, subcrest slopes of main ridge in vicinity of 'Camp 1,' low stature montane forest in cloud zone, GPS lat. $05^{\circ} 35.5' S$, \times long. $144^{\circ} 47.3' E$, elevation 2360 m, 05 Oct 1995 (fl), *W. Takeuchi* 10481 (A, BISH, BRIT, CANB, L, LAE); Bismarck Range, Mt. Oipu, ridge community between 'Camp 1' and Bubkile, low stature montane forest in cloud zone, GPS lat. $05^{\circ} 35.5' S$, \times long. $144^{\circ} 47.3' E$, elevation 2400 m, 07 Oct 1995 (fl), *W. Takeuchi* 10559 (K, LAE).

Papuasian *Pilea* have been treated in Winkler (1922) and van Royen (1982). Although both authors provide keys to species, the coverage of either account is incomplete. The genus still awaits a synthetical revision.

Pilea hedemarkii is distinguished from all other Papuasian congeners by the linear and uninervous leaves. The minute, orange-brown, and peltate scales are also distinctive, though not unique.

DISCUSSION

The expedition discovered about 15 confirmed or suspected new species, in addition to other noteworthy gatherings summarized in the preceding section. At least 613 distinct morphospecies were represented in the 730 collections made by the survey. It is instructive to compare the number of novelties reported here with two of the largest surveys recently concluded from other parts of Papuasia, both of which were also of approximately one month duration. The 1994 New Ireland survey produced only two new taxa (Takeuchi & Pipoly 1998), and a total of 8 novelties is suspected from the 1997 Lakekamu survey (Takeuchi & Kulang 1998). Results from the present expedition support previous estimates of high biodiversity in the Bismarck-Ramu tract, and justify enactment of conservation measures for the area. Due to inclement weather and the overall scarcity of fertile sightings, the collections coverage was far from comprehensive. There is clearly considerable scope for further discovery.

APPENDIX 1

Expedition Plant List From Bismarck-Ramu. Numbers refer to exsiccatae vouchers. SR = sight record without exsiccatae; (m) = male plant; (f) = female plant. Determinations by the author unless otherwise indicated. Asterisk (*) preceding binomial indicates presence of discussion in text.

AVASCULAR PLANTS

BRYIDAE

genus inder., 10675, 11003

FERNS AND FERN ALLIES

ADIANTACEAE

Syngamma quinata (Hook.) Carruth., 11062
Taenitis blechnoides (Willd.) Swartz, 10937

ASPLENIACEAE

Asplenium acrorygium Christ, 10537, 10970, 11055
Asplenium affine Swartz, 10526
Asplenium bipinnatifidum Baker, SR from Camp 3
Asplenium caudatum Forst. f., 10777, 10910
Asplenium cuneatum Swartz, 11051
Asplenium decorum Kunze, 10837
Asplenium moronense Copel., 10643B
Asplenium nidus L., SR from Camp 3
Asplenium phyllitidis Don subsp. *malescum* Holttum, 10893-A, 11050
Asplenium steerii Harrington, 10445, 10456
Asplenium cf. steerii Harrington, 10479
Asplenium submarginatum Rosenst., 10996
Asplenium tenerum Forst. f., SR from Camp 3
Asplenium unilaterale Lam., 11002
Didymochlaena truncatula (Swartz) J. Smith, 10924

ATHYRIACEAE

Diplazium bantanicum Blume, 11064
Diplazium cordifolium Blume, 10761, 11056
Diplazium escentium (Retz.) Swartz, 10781
Diplazium sp., 10779

BLECHNACEAE

Blechnum acutissimum (v.A.v.R.) C. Chr., 10435
Blechnum cf. *archboldii* C. Chr., 10604
Blechnum dentatum (Kuhn) Diels, 10828, 11074
Blechnum dentrolobatum Brause, 10423
Blechnum fraseri (A. Cunn.) Luerssen, 10576
Blechnum orientale L., SR from Camps 1 & 3
Stenochlaena areolaris (Harr.) Copel., 10772

CHEIROPLEURIACEAE

Cheiropleuria bicuspis (Bl.) Presl, 10942

CYATHEACEAE

Cyathea angensis (Gepp) Domin, 10848
Cyathea cf. cincinnata Brause, 10763
Cyathea gelensis Rosenst., 10551, 10561, 10706
Cyathea hornei (Baker) Copel., 10846

Cyathea perpeligera v.A.v.R., 10635, 10697

Cyathea wernerii Rosenst., 10794

Dicksonia cf. sciurus C. Chr., 10765

DAVALLIACEAE

Davallia divaricata Blume, 10776
Humata sp., 'alpina-neoguineensis group', 10572
Humata sp., 11066
Lemnophyllum pallida (Mett.) Copel., 10804, 10820

DENNSTAEDTIACEAE

Dennstaedtia glabrata (Cesati) C. Chr., 10688, 11087
Dennstaedtia sp., 'neoguineensis group', 10533
Histopteris estipulata v.A.v.R., 10698
Histopteris integrifolia Copel., 10889
Histopteris squamulata Holttum, 10483
Hypolepis bambusiana Rosenst., 10491
**Hypolepis scabristipes* Brownsey, 10778
Microlepia sp., 10646
Paeia radula (Baker) C. Chr., 10574

DIPTERIDACEAE

Dipteris conjugata Reinw., 10617, 10803

GLEICHENIACEAE

Dicranopteris linearis (Burm.) Underw., SR from Camp 1
Gleichenia brasiliensis C. Chr., 10611
Gleichenia dicarpa R. Br., 10616

GRAMMITIDACEAE

Calymmodon clavifer (Hook.) Copel., 10557
Ctenopteris sp., 'curtissii-ctenoideum group', 10575
Ctenopteris flagelliforme Brause, 10548
Ctenopteris cf. longiceps (Rosenst.) Copel., 10594B, 10946
Ctenopteris millefolia (Blume) Copel., 10578
Ctenopteris repandula Kunze, 11053
Ctenopteris stellatosetosa Copel., 10668
Ctenopteris (close to) *stellatosetosa* Copel., 11070
Ctenopteris subacundulifolia (Zoll.) Copel., 10549, 10699
Grammitis dolichosora (Copel.) Copel., 10594A, 10664
Grammitis cf. *dolichosora* (Copel.) Copel., 10915
Grammitis interrupta (Baker) Copel., 10607
Grammitis scabristipes (Baker) Copel., 10594D
Grammitis sumatrana (Baker) Copel., 10546, 10594C

Scleroglossum juncifolium Copel., 10627
Scleroglossum pusillum (Blume) v.A.v.R., 10390

HYMENOPHYLLACEAE

Hymenophyllum sensu lato:
Mecodium sp., 'badium-bamderianum group', 10679
Mecodium aff. *productum* (Kunze) Copel., 10839
Meringium cf. *gorgoneum* (Copel.) Copel., 10621
 cf. *Meringium* sp., 10550; sterile collection
Trichomanes sensu lato:
Cephalomanes oblongifolium Presl, 10916
Macroglena meifolia Copel., 10739
Macroglena schlechteri (Brause) Copel., 10651
 cf. *Macroglena* sp., 10721
Neopteris cf. *intermedia* (v.d.B.) Copel., 10969,
 11004
Plenromanes pallidum (Blume) Presl, 10628

Lindsaea group

Lindsaea obtusa J. Smith, 10691, 10844
Lindsaea obtusa J. Smith, 10705; pinnate form
Lindsaea pulchella (J. Smith) Mett. ex Kuhn,
 10838, 10932
Lindsaea pulchella (J. Smith) Mett. ex Kuhn
 var. *blanda* (Mett. ex Kuhn) Kramer, 10525
Lindsaea rigida J. Smith, 10696
Sphenomeris chinensis (L.) Maxon, SR from Camps
 3 & 4
Sphenomeris retusa (Cav.) Maxon, SR from Camps
 1,3, & 4
Tapeinidium sp., 10565

LOMARIOPSIDACEAE

Bolbitis heteroclita (Presl) Ching, 11021
Bolbitis rivularis (Brackenridge) Ching, 10995,
 11007
Bolbitis rivularis (Brackenridge) Ching, 11011;
 large form
Elaphoglossum novoguineense Rosenst., 10590
Lamagramma sinuata C. Chr., 10998

LYCOPODIACEAE

Huperzia nummulariifolia (Blume) Jermy, 10771
Huperzia phlegmaria (L.) Rothm., 11059
Huperzia aff. ?*pinifolia* Trevisan, 10877
Huperzia squarrosa (Forst. f.) Trevisan, 10935
Lycopodium volubile Forst. f., 10397
Palhinhaea cernua (L.) Vasc. & Franco, SR from
 Camps 1 & 3

MARATTIACEAE

Angiopteris erecta (Forst.) Hoffman, 10816
Marattia cf. *tafaensis* C. Chr., 10499, 10501

OLEANDRACEAE

Nephrolepis biserrata (Swartz) Schott, 10786
Nephrolepis birtsutula (Forst. f.) Presl, 11030

Nephrolepis lauterbachii Christ, 10605
Nephrolepis rosenstockii Brause, 10812
Nephrolepis schlechteri Brause, 10670, 10769
Oleandra cuspidata Baker, 10634, 10758, 10775
Oleandra sibbaldii Grev., 10703
Oleandra wernerii Rosenst., 10814

OPHIOGLOSSACEAE

Ophioglossum pendulum L., 10534

POLYPODIACEAE

Aglamorpha drymarioides (Hook.) Roos, SR from
 Camp 3
Aglamorpha beraclea (Kunze) Copel., SR from
 Camp 3
Belvisia mucronata (Fée) Copel. var. *mucronata*,
 11017
Belvisia novoguineensis (Rosenst.) Copel., 10412,
 10467, 10694
Belvisia validinervis (Kunze) Copel.
 var. *longissima* (Holttum) Hovenkamp & Franken,
 10509
Calyis polysora (Brause) Copel., 10893
Drynaria rigidula (Swartz) Bedd., SR from Camps
 2 & 3
Goniophlebium demersum (Brause) Rödl-Linder,
 10503
Goniophlebium pseudoconnatum (Copel.) Copel.,
 10817
Goniophlebium serratifolium Brackenridge, 10432,
 10484, 10489
Lecanopteris depariaoides (Cesati) Baker, 10802,
 distr. as *L. curtissii* Baker
Lemmaphyllum accedens (Blume) Donk, 10783,
 10925, 11008, 11010
Loxogramme peltioides Presl, 10487
Microsorum papuanum (Baker) Parris, 10477, =
Phymatosorus sp.
Microsorum sp., 10987, 11012
Phymatosorus commutatus (Blume) Pichi Sermolli,
 10801
Selliguea albidosquamata (Blume) Parris, 10505,
 10782, 10871, sn, distr. as *Crypsinus* spp.
Selliguea enervis (Cav.) Ching, 10528, 10759;
 'subgramineous' distr. as *Crypsinus subundulatus*
Selliguea bellwurgii (Diels) Hovenkamp, 10449,
 10558, 10931, distr. as *Crypsinus senescens*
Selliguea lauterbachii (Brause) Hovenkamp, 10439,
 distr. as *S. cf. gibbsiae*
Selliguea plantaginea Brackenridge, 10492; distr.
 as *Selliguea* sp.

PTERIDACEAE

Pteris blumeana Agardh, 10764
Pteris wallichiana Agardh, 10493
Pteris warburgii Christ, 10988

SCHIZAEACEAE

Scizaea dichotoma (L.) J. Smith, 11057*Scizaea fistulosa* Labill., 10700

SELAGINELLACEAE

Selaginella sp., 'angustiramea-bieronyniana group', 10517, 10930

Tectaria group

Pteridrys cf. *microthecia* (Fée) C. Chr. & Ching, 10980*Tectaria* cf. *christovalensis* (C. Chr.) Alston, 11014*Tectaria decurrens* (Presl) Copel., 10997

THELYPTERIDACEAE

Coryphopteris fasciculata (Fourn.) Holttum, 10620*Pleuroneuron murattioideum* (Alston) Holttum, 10547*Pneumatopteris sogorense* (Gepp) Holttum, 10810*Pneumatopteris* sp., 'superba-subappendiculata group', 10490, 10545*Pronephrium beccarianum* (Cesati) Holttum, 10645B*Pronephrium pentaphyllum* (Rosenst.) Holttum, 10736*Pronephrium* cf. *scopulorum* Holttum, or aff., 10645A, 10780, 10880*Pseudobegopteris aurita* (Hook.) Ching, 10485*Sphaerostephanus arboboldii* (C. Chr.) Holttum, 10416*Sphaerostephanus* cf. *arfakianus* (Baker) Holttum, 10993*Sphaerostephanus dimorphus* (Brause) Holttum, 10788*Sphaerostephanus novoguineensis* (Brause) Holttum, 10909*Sphaerostephanus unitus* (L.) Holttum var. *papilliform* Holttum, 10784*Sphaerostephanus* cf. *reticulatum* Holttum, 10808, 10911**Sphaerostephanus* sp. 'nov.', 10707, 10733cf. *Sphaerostephanus* sp., 10809

VITTARIACEAE

Autographum plantagineum (Cav.) Kaulfuss, 10542*Autographum reticulatum* (Forst.) Kaulfuss; s.l., 10898*Vittaria elongata* Swartz var. *angustifolia* Holttum, 10953

GYMNOSPERMS

GNETACEAE

Gnetum gnemon L., 10805

PODOCARPACEAE

Dacrydium cf. *imbricatum* (Blume) de Laub., 10899; sterile specimen*Podocarpus* sp. A, 'ledermannii-meruiformis leaf type', 10952; sterile collection*Podocarpus* sp. B, 10585; sterile collection

MONOCOTS

AGAVACEAE

Cordyline terminalis Kunth, SR from Camp 3

ARACEAE

Alocasia aequiloba N.E. Br., 11001*Alocasia nicolsonii* A. Hay, 10497*Amydrium zippelianum* (Schott) Nollesen, SR from Camp 4*Epipremnum pinnatum* (L.) Engl., SR*Holochlamys beccarii* Engl., 10999*Homalomena* sp. A, 10642, small short-stem herb*Homalomena* sp. B, 11110, robust cordate-leaf herb*Pothos* sp., § *Pothos*, 11063, sterile collection*Rhaphidophora* sp., 10865, Stone's architecture

ARECACEAE/PALMACE

Calamus cf. *reticulatus* Becc., 10569*Caryota rumphiana* Blume, SR from Camp 3*Heterospathe* sp. A, 10766*Heterospathe* sp. B, 10676, 10954*Hydriastele* sp., 11677*Korthalsia* cf. *zippelii* Blume, 11061*Limosadix* sp., 10712; not *L. albertiana**Orania* cf. *oreophila* Essig, 10875

COMMELINACEAE

Commelina diffusa Burm. f., 10789*Flacouria scandens* Lour., 10873*Forrestia mollissima* (Blume) Kds., 10989; as*Amischotolype* f. *marginata* (Blume) Baker*Pollia thyriflora* (Blume) Steud., 11076

COSTACEAE

Tapeinomelis bollringii K. Schum., 10985; det.

O. Gideon

CYPERACEAE

Carex alopecuroides D. Don var. *chlorostachys* (D. Don) Clarke, 10455*Carex graeffiana* Boeck., 10714*Carex lamprocblamys* S.T. Blake, 10564*Cyperus cyperinus* (Retz.) Valck. Sur., 11086*Cyperus distans* L. f., 10795*Cyperus kyllingia* Endl., 10770, 10774*Eleocharis attenuata* (Franch. & Sav.) Palla, 10629*Emblemata dichotoma* (L.) Vahl, 10835*Hypoderris compactum* Nees & Mey., 10933*Hypoderris nemorum* (Vahl) Spreng., 10900, 10912*Paracapana parvibractea* (Clarke) Uitrien, 10928*Scleria scribneriata* Nees & Mey., 10842

DIOSCOREACEAE

Dioscorea bulbifera L., 11035

FLAGELLARIACEAE

Flagellaria indica L., SR from Camp 3

HELICONIACEAE

Heliconia papuana W.J. Kress, 11045

JUNCACEAE

Juncus prismatocarpus R. Br. var. *indicus*, 10403

LILIACEAE

Dianella eusifolia L., 10419

MARANTACEAE

Pbrynum cf. macrocephalum K. Schum., 11047
Pbrynum sp., 10882

MUSACEAE

Musa sp., 11046

ORCHIDACEAE (dets. by N.H.S. Howcroft)

Aglaosorhyncha sp., 10641*Bulbophyllum* sp., § *Bulbophreatia*, 10384*Bulbophyllum* sp., § *Coelochilus*, 10460*Bulbophyllum* sp., § *Dialeipanthe*, 10921**Bulbophyllum* sp. nov., 10724*Bulbophyllum* sp., 10462, 10754, 10949, 11091*Bulbophyllum* or *Mediocalcar* sp., 10461*Cadetia aprina* (J.J. Sm.) Schltr., 10387*Ceratostylis* sp., 10755*Chitonochilus papuanus* Schltr., 10936*Codogyne beccarii* Rchb. f., 10861*Coelogyne* cf. *veitchii* Rolfe, 10864*Dendrobium cuthbertsonii* F.V.M., 10386*Dendrobium laevisii* F.V.M., 10950*Dendrobium* cf. *masarangense* Schltr., 10647*Dendrobium otaguroanum* A.D. Hawkes, 10640*Dendrobium* aff. *texillarium* J.J. Sm., 10459*Dendrobium* sp., § *Calyptrochilus*, 10586*Dendrobium* sp., § *Eriopxis*, 10753**Dendrobium* sp., § *Grastidium*, 10856; possible sp. nov.*Epiblastus* sp., 10472*Eria* aff. *ramuana* or *javanica*, 10633*Erythrodys* sp., or *Eurycentrum*, 10732; spur present*Glomera* cf. *aurea* Schltr., 10639*Glomera* sp., 10417, 10579, 10653*Glossyrrhyncha* sp., 10682*Goodyera* sp., 10388*Liparis* subg. *Menoneuron*, cf. § *Platychilus*, 10833*Liparis* or *Malaxis* sp., 10923*Mediocalcar* sp., 10391*Mediocalcar* sp., 10610*Mischobulbium lancilabium* Schltr., 10939*Oberonia* sp., 10836*Pedilochilus* sp., 10669*Pbreata* cf. *petiolata* Schltr., 10650*Pbreata* sp., § *Bulbophreatia*, 10392*Pbreata* sp., 10693*Platanthera papuana* Schltr., 10692*Podochilus* sp., 10527*Pseuderia* cf. *panciflora* Schltr., 11052*Spathoglottis plicata* Krzl., 10866, 11024*Zeuxine* sp., § *Hetaeropsis*, 10560

PANDANACEAE

Freyinetia cf. *angustissima* Ridley, 10725*Freyinetia* sp. A, 10881*Freyinetia* sp. B, s.n., Oct. 23, 1995*Pandanus* sp., 'adimobatriss-setistylus group', 10767*Pandanus* sp., § *Intraobtusus*, 10623*Pandanus* sp., 11071

PHILESIACEAE

Geronoplexis cymosum A. Cunn., 10592B

POACEAE/GRAMINEAE

Bambusa cf. *forbesii* (Ridley) Holttum, 10962*Isachne albens* Trin., 10476*Isachne albomarginata* Jansen, 10448*Isachne myosotis* Nees, 10684*Isachne pauciflora* Hack., 10938*Lophatherum gracile* Brongn., 10847*Pennisetum macrostachyum* (Brongn.) Trin., 10798*Saccharum officinarum* L., 10800*Setaria palmifolia* (Koenig) Stapf, 10465

SMILACACEAE

Smilax cf. *zeylanica* L., 11034

ZINGIBERACEAE

Alpinia odontonema K. Schum., 10683*Alpinia wernerii* Valeton, 10869*Alpinia* sp., § *Dieramalpinia*, 10964**Alpinia* sp., aff. *odontonema*, § *Psychanthus*, 10595*Etlangera angustifolia* (Valeton) R.M. Smith, 10538*Etlangera* sp., 10878; *Geantbus* (*Polyanthae*)*Pleuranthodium* sp., § *Psychanthus*, 10849, 10959*Riedelia gelvensis* (Laut.) Valeton, 10597*Riedelia monticola* Valeton, 10619, 10727*Riedelia rosacea* van Royen, or aff. *monticola*, 10708, 10757*Riedelia subulocalyx* Valeton, 10723

DICOTS

ACANTHACEAE

Hemigraphis aff. *primulifolia* (Nees) E. Vill., 11015*Leptosiphonium* sp., 10870*Ptyasiglottis* sp., 11006*Rungia klossii* S. Moore, 10524

ACTINIDIACEAE

Saurauia cf. *capitulata* A.C. Smith, or aff., 10596*Saurauia* aff. *conferta* Warburg, 10815, 11036*Saurauia congestiflora* A.C. Smith, 10826*Saurauia ilicifolia* van Royen, 10424*Saurauia* cf. *nannmanni* Diels, or aff., 10539, 10904, 11043*Saurauia schumanniana* Diels, 10940

Saurauia sp. A; ?sp. nov., 10447, 10570; no match at LAE
Saurauia sp. B, 10829; subglabrous

AMARANTHACEAE
Iresine herbstii Hook. f., 10796

ANACARDIACEAE
Campnosperma brevipetiolata Volk, SR from Camp 4

ANNONACEAE
Haplostichanthus longiracemis (Scheffler) van Heusden, 11088
 genus indet., 10667

APIACEAE
Hydrocotyle sibthorpioides Lamk, 10473, 10520

APOCYNACEAE
Alyxia markgrafii Tsiang, 11099
Parsonia cf. sanguinea (Wernham) Markgr., 11093
Parsonia sanguinea (Wernham) Markgr. var. *bracteata* (Markgr.) D.J. Middleton, 10735
Parsonia uareensis Kamelhara & Hatusima, 10906
Parsonia sp., 10860
Tabernaemontana pandacaqui Lam., 10967

AQUIFOLIACEAE
Ilex scabridula Merrill & Perry, 10841
Ilex spicata Blume, 10583

ARALIACEAE
Gastonia spectabilis (Harms) Philipson, 10956
Harmsiopanax ingens Philipson ssp. *ingens*, 10514
Mackinlaya celebica (Harms) Philipson, 10674
Mackinlaya schlechteri (Harms) Philipson, 10710
Osmoxylon novoguineense (Scheffl.) Becc., 10968
**Polyscias belensis* Philipson, 10580
Schefflera schumanniana Harms ssp. *schumanniana*, 10643, 10744
**Schefflera* ?sp. nov., aff. *sparsidentata* Frodin, 10427, 10471
Schefflera cf. *straminea* Frodin, 10498
Schefflera cf. *versteegii* Harms, 11109; also possibly *S. forbesii*

ARISTOLOCHIACEAE
Aristolochia sp., 10920; sterile collection

ASCLEPIADACEAE
Hoya sp., 10922
Tylophora cissoides Blume, 11025

ASTERACEAE/COMPOSITAE
Adenostemma lavenia (L.) O. Ktze., 10404, 10480
Ageratum corymbosum L., 10429
Arrhenchiton novoguineensis (S. Moore) Mattf., 10482B ssp. *novoguineensis*
Bidens pilosa L. var. *minor* (Blume) Sheriff, 10458
Blumea arfakiana Martelli, 10884

Blumea arnakiophora Mattf., 10536
Blumea sylvatica (Blume) DC., 10562
Blumea sylvatica (Blume) DC. var. *macrophylla* (Blume) Randeria, 10434, 10531
Blumea sylvatica (Blume) DC. var. *sylvatica*, 10454
Crassophodium crepidoides (Benth.) S. Moore, 10799
Erechtites valerianifolia (Wolf) DC., 10797
Mikania cordata (Burm. f.) B.L. Rob., 10879
Olearia platyphylla Mattf. var. *cineraria* (Mattf.) Koster, 10413
Olearia rufa Koster, 10598
Vernonia cuneata Less., 10831

BALSAMINACEAE
Impatiens bauckeri Bull, 10381, 10428, 10872

BEGONIACEAE
Begonia cf. *angustae* Irmscher, 10992
Begonia sp., 'kamensis group', 10441; climber, det. O. Gideon
Begonia tafaeensis Merrill & Perry, or aff., 10502, 10890

BIGNONIACEAE
Tecomanthe dendrophila (Blume) K. Schum. & Laut., 10704

BORAGINACEAE
Tournefortia sarmentosa Lamk, SR from Camp 4

BURSERACEAE
Haplolobus cf. *floribundus* (K. Schum.) H.J. Lam, 11092; 'floribundus-versteegii'

CAMPANULACEAE
Peracarpa carnosa (Wallach) Hooker & Thompson, 10544

CARDIOPTERIDACEAE
Cardiopteris moluccana Blume, 10793

CARYOPHYLLACEAE
Drymaria cordata (L.) Willd. ex Roem. & Schult., SR from Camp 3

CASUARINACEAE
Gymnostoma papuanum (S. Moore) L. Johnson, 10855

CELASTRACEAE
Celastrus monospermaoides Loes., 10851

CHLORANTHACEAE
Ascarina philippinensis C.B. Rob., 10613
Ascarina subsessilis Verde., 10760

CLusiaceae/Guttiferae
Garcinia archboldiana A.C. Smith, 10494
**Garcinia* sp. nov., 11098; det. P.F. Stevens
Garcinia sp., 10951

CRYPTERONIACEAE
Crypteronia cumingii (Planch.) Planch. ex Endl., 11104

CUCURBITACEAE

Trichosanthes sp., 10927A; sterile collection
Zebneria cissymbium (Jacobs) Jeffrey, 10737
Zebneria cf. *cissymbium* (Jacobs) Jeffrey, 10518

CUNONIACEAE

Acomititia reticulata (Schltr.) Hoogland, 10603
Caliduvia rufa (Schltr.) Hoogland, 10673
Ceratopetalum succirubrum C.T. White, 10853

DAPHNIPHYLLOACEAE

Daphniphyllum gracile Gage var. *gracile*, 10584

DILLENIACEAE

Dillenia cf. *schlechteri* Diels or cf. *quercifolia* White & Francis, 10495

ELAEOCARPACEAE

Aceratium parvifolium Schltr., 10806
Elaeocarpus tarientis Weibel, 10422, 10591
Sloanea brachystyla (Schltr.) A.C. Smith, 10747
Sloanea velutina (Schltr.) A.C. Smith, 10553

ELEAGNACEAE

Eleagnus triflora Roxb. cf. var. *brevilimbata* T. Hart, 10811, 10874

ERICACEAE

Dimorphanthera cornuta J.J. Sm. var. *tenuiflora* Sleumer, 10395
Dimorphanthera aff. *cornuta* J.J. Sm., 10743; det. P.F. Stevens
Dimorphanthera elegantissima K. Schum. var. *splendens* (Sleumer) P.F. Stevens, 10632 (f); det. P.F. Stevens

Dimorphanthera elegantissima K. Schum. var. *splendens* (Sleumer) P.F. Stevens, 11108 (fr)
Diplycosia edulis Schltr., 10908
Diplycosia moraeensis Sleumer, 10658
**Rhododendron anagalliflorum* Sleumer, 10389, 10686

Rhododendron beyerinckianum Koord., 10685
Rhododendron aff. *beyerinckianum* Koord., 10396; not the species

Rhododendron englerianum Sleumer, or aff., 10863
Rhododendron cf. *maclellandiae* F.v.M. var. *glabrifolium* (J.J. Sm.) Sleumer, 11073

Rhododendron superbum Sleumer, 10859
Rhododendron wrightianum Koord. var. *insulare* Sleumer, 10636

Vaccinium reticulato-venosum Sleumer, 10887
Vaccinium sp., § *Oariantbe*; aff. *villosiflorum* J.J. Sm., 10907

EUPHORBIACEAE

**Antidesma* aff. *chalaranthum* Airy Shaw, 10716
**Antidesma katikii* Airy Shaw, 11054, 11079
Aporosa sp., 'brevicandata-squarrosa group', 10701 (f), 10722 (m)

Aporosa laxiflora Pax & Hoffman, 10582
Brynia cernua (Poir.) Muell. Arg., 10529
Bridelia penangiana Hook. f. cf. var. *penangiana*, 11020

Claoxylon coriaceo-lanatum Airy Shaw, 10519
Endospermum labios Schodde, 11048
Euphorbia plumerioides Teijsm. ex Hassk. var. *acuminata* J.J. Sm., 10792

**Glochidion* sp. nov., 10543
Macaranga aleuritoides F. Muell., SR from Camp 4
Macaranga bifoveata J.J. Sm., 10972
Macaranga candata Pax & Hoffman, 10414, 10470

**Macaranga reticulata* Pax & Hoffman, 10496, 10508
**Mallotus papuanus* (J.J. Sm.) Pax & Hoffman, or aff., 10947

Omalanthus novo-guineensis (Warburg) K. Schum., 10407, 10957

FAGACEAE

Castanopsis acuminatissima (Blume) A. DC., 11082
Lithocarpus cf. *celebicus* (Miq.) Rehd., 10785

FLACOURTIACEAE

Flacourta zippelii Slooten, 11039
Pangium edule Reinw., SR from Camp 4

GESNERIACEAE

Aeschynanthus sp. A, 10442
Aeschynanthus sp. B, 10630
Aeschynanthus sp. C, 10678
Cyrtandra fusco-vellea K. Schum., 11009
Cyrtandra aff. *janowskyi* Schltr., 10897, 11078
Cyrtandra sp., subgenus *Cyrtandra*, 10443, 10741
Cyrtandra sp., subgenus *Cyrtandra*, 10510
Cyrtandra sp., § *Diplachiton*, 10469, 10715
Cyrtandra sp., cf. § *Diplachiton*, 10506, 10599
Cyrtandra sp., cf. § *Diplachiton* or § *Loxolobus*, 10440
Cyrtandra sp., § *Geodesme*, 10383, 10452, 10681
Cyrtandra sp., § *Loxophyllum/Phaeotrichium*, 10577, 10637, 10840
Cyrtandra sp., cf. § *Loxophyllum/Phaeotrichium*, 10734
Cyrtandra sp., § *Macrocyrtandra*, 10631
Cyrtandra sp., 10709; possibly = sp. 10443
Dicratrichium sp., 10636, 10883
Rhynchosciadium obliquum Blume, 10986

GOODENIACEAE

Scaevola oppositifolia R. Br., 10832

GROSSULARIACEAE

Polyosma aff. *subalpina* Schultz-Menz., 10555, 10677

HALORAGACEAE

Gonocarpus balconensis (Merrill) Orchard, 10600

Gunnera macrophylla Blume, 10420

HYDRANGEACEAE
Didyma febrifuga Lour., 10426; 'sylvatica complex'

LAMIACEAE/LABIATAE
 **Basilicum* sp., 10626, 10972
Orthosiphon aristatus (Blume) Miq., 10966
Plectranthus parviflora Willd., 10581

LAURACEAE
Actinodaphne nitida Teschner, 11105
Actinodaphne tomentosa Teschner, 10752
Cinnamomum clemensi Allen, 10649
Cinnamomum cf. *podagricum* Kostermans, 10845
Cryptocarya aff. *fuscapilosa* Teschner, 10516
Cryptocarya nothofagetorum Kostermans, 10652,
 10680, 10728
Litsea carrii Kostermans, 10444

LEEACEAE
Leea indica (Burm. f.) Merrill, 10825, 11040

LEGUMINOSAE/FABACEAE
Derris canefolia sensu Verdc., 11031
Desmodium repandum (Vahl) DC., 10457
Desmodium sequax Wall., 10895, 11023
Indocarpus 'ribidus morphotype', *papuanus* group,
 11083; sensu Verdcourt
Mucuna noto-guineensis Schell., SR from Camp 4
Pueraria pulcherrima (Koord.) Koord.-Schumacher,
 11029

LOGANIACEAE
Fagraea cf. *ceilanica* Thunb., 10729
Fagraea elliptica Roxb., 11106
Geniostoma aff. 'rupestre complex', 10644

LORANTHACEAE
Anytema squarrosum (Krause) Danser ssp.
squarrosum, 10468
Macrosolen cochinchinensis (Lour.) Tiegh. var.
cochinchinensis, 10854

MAGNOLIACEAE
Elmervillia tsampaca (L.) Dandy ssp. *tsampaca*,
 10738

MELASTOMATACEAE
Astronia atro-viridis Mansfeld, 10437, 10612
 **Astroniidium* cf. *notoguineense* Merrill & Perry,
 10762
Astroniac indet., 10523; probably *Astronia* sp.
Beccarianthus sp., 10902
Creuchiton notoguineensis (Baker f.) Veldkamp &
 Nayar, 11094
Dissochaeta angieana Ohwi, 10790
Medinilla albida Merrill & Perry, 10654
Medinilla aff. *albida* Merrill & Perry, 10556;
 but leaves sessile

Medinilla dentata Veldkamp, 10666
Medinilla bellringiana Mansfeld, 10852
Medinilla aff. 'lorentziana-teysmannii group', 10862;
 closer to *lorentziana*
Medinilla sogeriensis Baker f., or aff., 10406
Medinilla teysmannii Miq., 10977
 **Medinilla* sp. nov., 10408
Melastoma malabathricum L., 10398
Otanthera adpressa Mansfeld, 10888
Poikilogyne furfuracea Markgr., 10400
Poikilogyne macrophylla (Cogn.) Mansfeld, 11095

MELIACEAE
Aglaia cf. *silvestris* (M. Roemer) Merrill, 10665;
 but leaflets symmetric
Aglaia aff. 'tomentosa group', 10813; but infl.
 pendant, ?new
Chisocheton lasiocarpus (Miq.) Valetton, 11000;
formicarium-pachyrrhachis
Dysoxylum cunctophyllum Harms, 10438, 10751

MONIMIACEAE
Kibara karengana Philipson, 10554
Levieria montana Becc., 11049
Palmeria arfakiana Becc., 10401
Palmeria gracilis Perkins, 10876
Steganthera hospitiana (Becc.) Kanchira & Hatusima,
 11041
Steganthera ilicifolia A.C. Smith, 10593, 10749
 **Steganthera insculpta* Perkins, 10513, 10672

MORACEAE
Ficus adelpa Laut. & K. Schum., 10903
Ficus arbuscula Laut. & K. Schum., 11038
Ficus comitis King, 11100
Ficus opposita Miq., 10726, 10730
Ficus pungen Reinw. ex Blume, SR from Camps
 3 and 4
Streblus urophyllus Diels, 10601

MYRISTICACEAE
Myristica pachyphylla A.C. Smith, 10660
Myristica subalata Miq., 10787, 10929
Myristica velutina Markgr., 10711

MYRSINACEAE (dets. by J. Pipoly)
Ardisia forbesii S. Moore, or aff., 11060
Ardisia sp., 10718
Conandrum polyanthum (Laut. & K. Schum.) Mez,
 10824
Fittingia sp., 10661, 10745
Mesa papuana Warburg, 10960; det. WT
Myrsine acrostica (Mez) Pipoly, 10857
 **Myrsine* aff. *acrostica* (Mez) Pipoly, 10958;
 possible sp. nov.
Myrsin leontis (K. Schum.) Pipoly, 10573, 10671

MYRTACEAE

Kania engenoides Schltr., 10540, 10648
Metrosideros ramiflora Laut. var. *humilis* (Diels)
 Dawson, 10474
Rhodomyrtus novoguineensis Diels, 10568
Syzygium cf. *longipes* Merrill & Perry, 10914
Syzygium malaccense (L.) Merrill & Perry, s.
 lat., 10719
 **Syzygium* aff. *megistophyllum* Merrill & Perry,
 11068
Xanthomyrtus montivaga A.J. Scott, 10602

NEPENTHACEAE

Nepenthes maxima Nees, 10592, 10713

OCHNACEAE

Schuurmansia benningsii K. Schum., 10515;
 characteristic robust form
Schuurmansia benningsii K. Schum., 10409; di-
 minutive form

PIPERACEAE

Peperomia cf. *gurakorana* Dull, 11067
Peperomia pellucida (L.) Kunth, 10695
Piper bolanicum Chew, 10411
Piper caninum Blume, 11072
 **Piper lessertianum* (Miq.) C. DC., 10874B, 10927
Piper cf. *pseudoamboninense* C. DC., or aff., 10975
Piper radatzii K. Schum. & Laut., 10541, 10702,
 10773, 11032
Piper subbulatum K. Schum. & Laut., 10822
Piper subcaninum C. DC., 10486
Piper triangulare Chew, 10552

PITTOSPORACEAE

Pittosporum pullifolium Burk. ssp. *ledermannii*
 (Pritzel) Schodde var. *ledermannii*, 10618
Pittosporum sinuata Blume var. *sinuata*, 11058
Pittosporum sinuata Blume var. *efuniculare* Steen.,
 10405, 10655, 10689

POLYGALACEAE

Polygala paniculata L., 10834

POLYGONACEAE

Muehlenbeckia platyclada (F. Muell.) Meissn., 10934
Polygonum chinense L., 10466

PROTEACEAE

Helicia cf. *forbesiana* E.v.M., 11103
Helicia microphylla Diels, 10609
Helicia obtusata Sleumer, 10638
Helicia oreadum Diels, or aff., 10917

RHAMNACEAE

Alphitonia excelsa (Fenzl) Reiss. ex Endl., SR from
 Camp 3
Ziziphus papuana Laut., or *Z. djamuensis* Laut.,
 SR from Camp 4

ROSACEAE

Prunus dolichobracta (K. Schum. & Laut.) Kalkman,
 11037
Prunus pullei (Koehne) Kalkman, 10608
Prunus sclerophylla Kalkman, 10742
 **Prunus* sp. nov., 10588
Rubus archboldianus Merrill & Perry, 10451, 10563
Rubus moluccanus L. var. *moluccanus*, 11013
Rubus moluccanus L. var. *obtusangulus* Miq., 10453
Rubus trigonus Kalkman, 10463

RUBIACEAE

Arisperma ramiense Laut. & K. Schum., 10905
Argostemma sp., 10385; nor *A. bryophilum*
Dolicholobium oxylobum K. Schum., 11042
Gardenia pallens Merrill & Perry, 10625
Hedysotis congesta R. Br., 10965
Hedysotis pubescens Valeton, 11080
Hydnophytum radicans Becc., 10943
Hydnophytum virgatum Valeton, 11069
Ixora dolichothysa Brem., 10945
Morinda umbellata L. var. *papuana* Valeton, 10886
Mussaenda oreadum Wernham, 10867; det. O.
 Gideon
Mussaenda scratchleyi Wernham, 11097; conf.
 O. Gideon
Myetia javanica (Blume) Reinw. ex Korth., 10978
Myrmecodia melanacantha Huxley & Jebb, 10720
Myrmecodia schlechteri Valeton, 10720B
Nertera granadense (Mutis ex L.f.) Druce, 10504
Ophiorrhiza aff. *?amoena* Valeton, 10991, 11019
Ophiorrhiza debrunyi Valeton, 10382
Ophiorrhiza tenelliflora Valeton, 10926
Pavetta platyclada K. Schum., 10983
Psychotria ampliphylla Valeton, 10791
Psychotria multicostata Valeton, 11065
Psychotria aff. 'naniflora' group, 10662
Psychotria olivacea Valeton, 11102
Psychotria phaeochlamys (Laut. & K. Schum.)
 Valeton, 10982

Psychotria ramadecumbens Sohmer, 10768
Psychotria valetontiana Sohmer, 10399, 10941
 **Psychotria* sp. nov., 11090
Tarenna barbellata Valeton, or aff., 10830
Timonius belense Merrill & Perry, 10587
Timonius aff. *xanthocarpus* Merrill & Perry, 10418
Uncaria bernaysii E.v.M., 10827
Urophyllum brittanicum Wernham, or aff., 10756

RUTACEAE

Acronychia ledermannii Laut., 10717, 10750
Flindersia pimenteliana E.v.M., 10944
Melicope sp. A, 10606; small trifoliolate leaves,
 congested inflorescence
Melicope sp. B, 10615; subcaudate petiolate leaflets
Melicope sp. C, 10823; gestalt like *Melicope*

micronata; leaflets villous, sessile, to 37 cm \times 20 cm

Melicope sp. D, 10892; glabrous obovate leaflets

SABIACEAE

Sabia pauciflora Blume, 11026

Meliosma pinnata (Roxb.) Maxim. ssp. *humilis* (Merrill & Perry) Beus., 10488

Meliosma pinnata (Roxb.) Maxim. ssp. *macrophylla* (Merrill) Beus., 11107

SANTALACEAE

Cladomysa cuneata Danser, 10436

SAPINDACEAE

Arytera aff. *multijuga* or *macrobotrys*, 10976

Cupaniopsis macrappa Radlk., 11089

Grewia comesperma Radlk., 11094A

Pometia pinnata Forst. & Forst. f., SR from Camps 3 and 4

Sarcopteryx crispa Welzen, 11101

SAPOTACEAE

Planchonella monticola (Krause) H.J. Lam, 10589; presumably better as *Sideroxylon monticola* Krause

SOLANACEAE

Solanum anfractum Symon, 10530; det. Symon

Solanum rostellatum Merrill & Perry, 10663; det. Symon

SPHENOSTEMONACEAE

Spbenostemon papuanus (Laut.) Steen. & Erdtman, 10731

STERCULIACEAE

Sterculia ampla Baker f., 10963

Sterculia schumanniana (Laut.) Mildbr., 11085

Sterculia cf. *schumanniana* (Laut.) Mildbr., 11081

SYMPLOCACEAE

Symplocos cochinchinensis (Lour.) S. Moore, 10566

Symplocos cf. *cochinchinensis* (Lour.) S. Moore, 10415

Symplocos cochinchinensis (Lour.) S. Moore ssp. *leptophylla* (Brand) Nooteb., 10614, 10746

Symplocos cochinchinensis (Lour.) S. Moore var. *schumanniana* (Brand) Nooteb., 10748, 10843, 10961

cf. *Symplocos*; small leaves, ?uniflorous, 10507

THEACEAE

Eurya cf. *leptantha* Diels, 10394

Eurya sp., 'leptantha-merrilliana group', 10657

Eurya rigang K. Schum. & Laut., 10421, 10571

Termitroenia brittoniana E.v.M., 10532, 10624

Termitroenia cherryi (E.M. Bail.) Merrill, SR between Camps 3 and 4

THYMELAEACEAE

Pbaleria macrocarpa (Scheff.) Boerl., 10430

TRIMENIACEAE

Trimenia papuana Ridley, 10393, 10402

ULMACEAE

Parasponia rigida Merrill & Perry, 10567

Trema cannabina Lour., 10918

URTICACEAE

Boehmeria platyphylla D. Don, s. lar., 11016

Boehmeria sp., 10522 (m); ?*Cypholobus* *Cypholobus nummularius* H. Winkler, 11018

Debregeasia sp., 10464

Elatostema beccarii Schroeter, 10894

Elatostema aff. *belense* Perry, 10891, 10994

Elatostema blackmoorei Ridley, 10450, 10478

Elatostema macrophyllum Brongn., 10979

Elatostema mongense Laut., 10535

Elatostema morobense Perry, 10433

Elatostema motu-guineense Warburg, 10885, 10896, 11022

Elatostema tridens Perry, 10475

Elatostema weinlandii K. Schum., 11096 (f)

Laportea decurrens (Roxb.) Wedd., 10974

Leucosyce capitellata (Pour.) Wedd., 11044

Pilea effusa H. Winkler, 10512

Pilea federmannii H. Winkler, 10687

Pilea stenoneura H. Winkler, 10521, 10410

**Pilea* sp. nov., 10481, 10559, 10740

Pipturus argenteus (Forst. f.) Wedd., 10446 (m), 10500 (f), 10990 (f)

Pipturus pullei H. Winkler, or aff., 10511

Porkilopermum inaequale Chew, 10858 (f), 10984 (m)

Procris frutescens Blume, 10901

Procris sp., 10981

VERBENACEAE

Calliarpa longifolia H.J. Lam, 10973

Geunia pentandra (Roxb.) Merrill, 10821

Stachytarpheta cayennensis (Rich.) Vahl, 11028

VITACEAE

Cayratia geniculata Blume, or aff., 11022

Cayratia japonica (Thunb.) Gagn., SR from Camp 4

Cissus aristata Blume, 10948

Cissus discolor Blume, SR from Camp 3

Tetrastigma lauterbachianum Gilg, 11033

WINTERACEAE

Zygogynum oligocarpum (Schltr.) Vink, 11084

Zygogynum cf. *sylvestre* (A.C. Smith) Vink, 10850

FAMILY INDET., 10425, 10431

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